

inches at Neah Bay, Wash., on the 24th. Gales of exceptional severity prevailed along the Pacific coast during the 23d, 24th, and 25th. The highest velocity reported occurred at Point Reyes, Cal., where, during a 5-minute period at 11 a. m. on the 25th, 98 miles an hour was recorded, with an extreme velocity for one mile at the rate of 103 miles an hour. By the morning of the 26th, the center of this storm had reached Wyoming, and during the succeeding twenty-four hours it passed southeastward to southern Missouri, where, on the morning of the 28th, the center of disturbance had moved northeastward over the upper Mississippi Valley, with minimum reported barometric pressure of 28.68 inches at Davenport, Iowa. It then passed northeastward over Lake Superior, with gradually diminishing energy. The Pacific storm just referred to caused the heaviest gales of the month in the Gulf and South Atlantic States.

A storm that appeared over extreme northwest Texas on the morning of the 22d, reached the lower Mississippi Valley on the morning of the 24th, and passing thence northeastward over the Atlantic coast States from the 25th to the 28th, was attended by heavy precipitation and high temperature, which resulted in destructive floods in the Apalachian Mountain districts.

Warnings were displayed well in advance of the gales of the month, and no severe storms occurred for which warnings were not issued.

The destructive floods in the Appalachian Mountain streams during the closing days of the month constituted a notable feature of February. A detailed account of these floods and of action taken by the Weather Bureau in issuing warnings in connection therewith will appear in the March REVIEW under the heading Rivers and Floods. Preliminary advices regarding flood prospects were issued from Washington on February 22 and 23, and on the morning of the latter date the following information was telegraphed Weather Bureau stations in Pennsylvania and West Virginia:

Warmer weather indicated for next two days, with conditions favorable for rain by Monday night. These conditions will be most favorable for a general breaking up of ice in the mountain rivers and streams of Pennsylvania, western Maryland, and West Virginia. Notify all interests concerned that danger from flood in low lying land is imminent.

The following extracts indicate the character and value of the warnings issued at stations of the Weather Bureau in Pennsylvania and West Virginia:

Pittsburg Dispatch, March 2, 1902.

WEATHER BUREAU'S GOOD SERVICE.

Seldom has the value of the Weather Bureau been more effectively demonstrated than during the present flood. The first warning sent from Washington headquarters was issued as early as last Sunday, February 23. The local bureau at once notified every one likely to be interested—railroads, trolley lines, police headquarters, and river operators—to expect very high water. This was followed by securing reliable and early reports from all points in the watershed, the Pittsburg observer remaining on duty continuously Thursday and Friday nights, receiving and distributing the latest reports. Thanks to this valuable and efficient service transportation companies, warehouses, commission merchants, and the river interests were enabled to save a considerable amount of property.

The police of the two cities also rendered splendid service. When, on Friday, the 28th, it was seen that there would be a 30-foot stage, the Weather Bureau promptly advised the heads of the police departments in Pittsburg and Allegheny, and officers were at once instructed to notify persons having residences or property in the districts in danger. As a result when the flood did come there was very little property in the cellars, and as far as possible that in danger elsewhere had been removed to safety. That the damage did not far exceed what it does is due to the early warnings of the forecast officials and the excellent work performed by the local office.

Parkersburg News, March 4, 1902:

The accuracy of the weather department's prognostications has been remarkable, and gives the public an added faith in the efficiency of that important and valuable branch of the Federal Government.

The following is an extract from a report made by the official in charge of the Weather Bureau office at Scranton, Pa.:

At 11:38 a. m., February 23, a flood warning was received from the Central Office; it was immediately given to the chief dispatcher of the Delaware, Lackawanna, and Western Railroad, telephoned to the chief dispatcher of the Delaware and Hudson Railroad at Carbondale, to the director of public safety of the city, and to the chief operator of each of the telephone companies, and the warning in full was printed on about 400 cards and mailed to as many addresses throughout this section of the State; copies were also delivered to all the local newspapers. By these means the warning was so widely disseminated throughout northeastern Pennsylvania that no one need have been ignorant of the effect of a rain or sudden thaw on the streams and rivers.

A rapid thaw did not occur until February 28, when a rain set in accompanied by high temperature which melted the snow and ice very rapidly, and caused alarming floods in all streams and rivers throughout this section of the State. The flood continued throughout March 1 and 2, and in the Susquehanna River during the 3d. At this time it is impracticable to obtain an accurate estimate of the damage done, but a fairly approximate estimate of the damage to city property, made by the director of public works, is \$50,000.

BOSTON FORECAST DISTRICT.

The weather of the month was quite stormy, with sudden and decided changes in temperature, which were announced in the forecasts. The most notable storms occurred on the 2d and 17th. The first caused high southerly and westerly winds, while the storm of the 17th was accompanied by easterly winds of great force. The depression of the barometer in each storm was remarkably low. Warnings were displayed well in advance of the high winds, and no storm winds occurred for which warnings were not displayed. It is believed that shipping was greatly benefited by the warnings.—*J. W. Smith, Forecast Official.*

CHICAGO FORECAST DISTRICT.

The temperature continued much colder than usual during the first three weeks of the month, but the last week was marked by a rapid rise in temperature.

Warnings were issued well in advance of the cold wave which overspread the district the first part of the month, but similar warnings were not required during the remainder of the month.

Advisory messages were sent to open ports on Lake Michigan on the 2d and 3d for high northwest winds which occurred in connection with an advancing cold wave. No other storm of marked importance approached the Lake region during the month until the last few days, the western storms generally being diverted to the south of the district. On the 26th a storm of remarkable extent and intensity crossed the country from the Pacific coast and slowly approached the Lake region with constant and increasing energy. Storm warnings were sent to all ports with the advice to hold the vessels in safe harbors, and no casualty has been reported.—*H. J. Cox, Professor.*

NEW ORLEANS FORECAST DISTRICT.

The month was characterized in this district by a number of moderate storms, for which warnings were displayed. No storm occurred without warnings, and, as a rule, those issued were verified. Cold wave warnings were ordered in portions of the district on the 3d and 4th, and no cold waves occurred without warnings. Frost warnings were issued for the sugar and truck growing districts on the 10th, 16th, 20th, and 21st. Timely warnings were issued for all frosts that occurred.

The forecasts of temperature and rainfall proved satisfactory to interests which make use of such information.—*I. M. Cline, Forecast Official.*

DENVER FORECAST DISTRICT.

The weather conditions during February were very unsettled as a result of the development of a large number of low areas

on the middle-eastern slope. Strong anticyclonic conditions were notably absent, however, in more northerly districts, and and practically no warnings were issued or needed.

The precipitation, which was prolonged in the southwestern mountain region during the closing days of the month, was fully covered in the forecasts from twenty-four to thirty-six hours in advance. Great loss of life and property resulted from snow slides.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

The month, as a whole, was an unusually stormy one on the California coast, and in marked contrast to the earlier part of the winter. From a dry season there was a decided change in the other direction, and the month closed with a record of the heaviest rainfall for many years, insuring an ample supply of water for the growing season.

The month began with heavy frosts generally, which were followed by rain or light snow from the Tehachapi northward. On the 21st heavy rain fell generally over California. On the 24th warnings were sent to points in the Sacramento Valley that the rivers would rise rapidly Monday night and Tuesday. River warnings were continued until the 27th, and in every case verified. The most pronounced storm of the season was shown on the morning map of February 25. Pressure readings below 29.00 inches were recorded during the day. Southeast storm warnings were displayed on the entire coast of California and verified at nearly all points. At Point Reyes Light, Cal., the 25th opened with light rain and a terrific southeast storm in progress. The wind increased rapidly to 90 miles an hour at 10:15 a. m., and continued at that velocity until after 12 noon, very frequently reaching velocities of 98 to 100 miles an hour. A maximum velocity of 98 miles occurred at 11:15 a. m., at which time an extreme velocity of 103 miles was recorded, one mile being registered in thirty-five seconds. On the 25th warnings of high southerly winds in Nevada and a rapid rise in the Sacramento River were also issued.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

The weather in the North Pacific States during February was unusually stormy, with an excess of precipitation, and with temperature above the normal. Incoming vessels reported gales of hurricane strength near the American coast, which caused considerable damage to rigging, etc. On account of rough seas and strong head winds, many ships were kept off the mouth of the Columbia River or near the entrance to the Strait of Juan de Fuca two to three weeks before they were able to enter the harbors they sought. The Alaska steamers brought the information that southern Alaska was bare of snow and that the winter there had been unusually mild.

February storms passed across this district in a lower latitude than usual, and the month was a phenomenal one in many respects. Two severe windstorms swept between the coast and the Cascade Mountains, and both were successfully forecast. The other storms of the month passed across the district without causing unusually high winds. During the passage of a disturbance on the 25th, the extraordinary low barometer reading of 28.84 inches was recorded at Neah Bay.—*E. A. Beals, Forecast Official.*

HAVANA FORECAST DISTRICT.

On the 20th the following forecast was issued for the entire Island of Cuba:

12:30.—A storm of some energy is central in the Gulf of Mexico southeast of New Orleans. Brisk to high southeast winds will gradually veer and become northwesterly during Friday, with falling temperature.

Daily forecasts for the benefit of the marine interests were furnished the captain of the port of Havana during the month.—*W. B. Stockman, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.	31, p. m.*	51	120	3, a. m.	36	87	Miles, 2,200	Days, 2.5	880	36.7
II.	2, p. m.	54	114	6, a. m.	38	75	2,800	3.5	800	33.3
III.	7, a. m.	53	108	11, p. m.	30	80	2,300	4.5	511	21.3
IV.	12, p. m.	50	97	16, p. m.	27	97	1,950	2.0	488	20.3
V.	18, p. m.	47	96	22, a. m.	48	68	2,050	2.5	586	24.4
Sums							11,300	18.0	3,265	136.0
Mean of 5 paths							2,260		653	27.2
Mean of 18.0 days									628	26.2
Low areas.										
I.	31, p. m.*	29	95	3, p. m.	48	68	2,300	3.0	767	32.0
II.	4, a. m.	46	84	6, a. m.	47	54	1,500	2.0	750	31.2
III.	14, p. m.	37	75	19, a. m.	46	60	1,400	1.3	1,077	45.2
IV.	12, p. m.	38	105	22, p. m.	82	65	3,250	6.5	500	20.8
V.	17, a. m.	51	120	27, a. m.	45	64	4,250	3.5	773	32.2
VI.	20, p. m.	53	114	28, p. m.	46	87	3,750	6.5	577	24.0
	25, p. m.	48	125				2,550	3.0	850	35.4
Sums							19,000	27.8	5,294	220.8
Mean of 7 paths							2,714		756	31.5
Mean of 27.8 days									695	29.0

*February.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk, Forecast Division.*

RIVERS AND FLOODS.

During February the precipitation in the Atlantic and Gulf States ranged from 1 to 4 inches above the normal amount, and as a result all the rivers were in flood at some time during the month. On the Pacific coast the excess was far greater, ranging from 1 inch in the Plateau region to as high as 12 inches on the coast. The distribution of precipitation was such, however, that there were no floods except in the northern California rivers. At Portland, Oreg., unseasonably low water prevailed during the earliest days of the month.

The Mississippi system, except the Ohio, presented nothing of interest, although comparatively high stages prevailed below Cairo, Ill., owing to the moderate flood tide that came out of the Ohio. The crest of this flood passed the mouth of the Great Kanawha River on the 31st of January and reached New Orleans, La., on the 20th of February. The light rains of the last three or four days of January over the South Atlantic and east Gulf States had also materially raised the rivers in that section, and the heavy rain of February 1 rapidly brought them above the danger-line stages. Warnings were issued as usual and no great damage was done.

The Sacramento River was high a great portion of the month, owing to the excessive rains over its watershed. Warnings were given at the proper times for all portable property to be removed to high ground and for levees to be looked after. On the 13th there were four breaks in the levee between Princeton and Colusa, Cal., and a large wheat area was overflowed. Another rapid rise set in on the 23d, and warnings were once more widely distributed. All low lands south of Red Bluff, Cal., were overflowed, and the town of Tehama, Cal., was flooded. Levees were again broken at Colusa and 40,000 acres of wheat lands flooded, making the crop a total